2.0 Regulation Governing Individual Onsite Wastewater Disposal

Design Standard III
Aggregate Replacement Disposal Systems
Large Diameter Aggregate Replacement Systems III-A
Multi-Pipe Aggregate Replacement Systems III-B
Expanded Polystyrene (EPS) Aggregate Systems III-C
Chamber Subsurface Disposal Systems III-D

Mississippi State Department of Health
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Mississippi State Department of Health

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Aggregate Replacement Disposal Systems
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Design Standard III
Aggregate Replacement Disposal Systems

I. Introduction

In a conventional onsite wastewater system treatment begins in the septic tank, under anaerobic conditions. Final treatment and disposal takes place in the soil of the drainfield, an aerobic environment. It is necessary for this aerobic condition to exist in the soil of the drainfield for proper treatment of the effluent.

II. Definitions

1. Chamber System - a system of bottomless molded plastic chambers installed in direct contact with the trench bottom to infiltrate primary treated effluent into the soil for final treatment and disposal.

2. Fragipan - a loamy subsurface horizon with high bulk density relative to horizons above it, and is seemingly cemented when dry with hard or very hard consistency. When moist, fragipans have moderate or weak brittleness, and dry fragments slake or fracture when placed in water. Fragipans are usually mottled and slowly or very slowly permeable to water.

3. Frequent Flooding - flooding likely to occur often under usual weather conditions (more than a 50 percent chance of flooding in a year, or more than 50 times in 100 years).

4. Aggregate Replacement Disposal System - any normally gravity-fed subsurface disposal field utilizing an alternate media or technology to act as a replacement for the aggregate media. These system depths range from 36 to 6 inches in depth .

Standard Subsurface Disposal	25 in. to 36 in.
Shallow Subsurface Disposal	13 in. to 24 in.
Ultra-shallow Subsurface Disposal	6 in. to 12 in.

5. Large Diameter Aggregate Replacement System - subsurface disposal system that utilizes large diameter pipe covered with a filtering material approved by the Mississippi State Department of Health for use in IOWDS systems.

6. Multi-Pipe Aggregate Replacement System - subsurface disposal system that utilizes a multiple arrangement of piping, approved by the Mississippi State Department of Health, to replace the aggregate media of conventional soil absorption systems for use in IOWDS systems.

7. Impervious - resistant to penetration by air, water, and roots.

8. Permeability, soil - transmission of air and water through the soil.

9. Plot Plan - a descriptive drawing, including a legal description of the property, indicating the property dimensions, house location, plumbing stub-outs, driveways and other pertinent information for the proper determination of an adequate individual onsite wastewater disposal system.

10. Sensitive Waters - public or private waters used for recreation (swimming, skiing, fishing), shellfish harvesting, potable water intake or other situations where people are likely to come into contact with the water.

11. Sewage - water-carried discharges from residences or similar establishments including excreta and other liquid waste.

12. Single Family Residence - a structure occupied by a related family unit.

13. Site Evaluation - the process of gathering information used to determine the suitability of the property for the construction of an individual onsite wastewater disposal system.

14. Skeletal - rock fragments 2 mm in diameter or larger make up 35 percent or more by volume; enough earth to fill interstices larger than 1 mm; the fraction finer than 2 mm is sandy, loamy, or clayey as defined by USDA particle-size classes.

15. Slope - deviation of a plane surface from the horizontal; when given in percent (%), it is the rise or fall of the land surface in feet per 100 feet of horizontal distance.

16. Soil Boring - a hole bored or dug below the depth of the proposed subsurface disposal system in order to determine the suitability of the soil for subsurface absorption.

17. Soil Horizon - a layer of soil approximately parallel to the land surface and differing from adjacent genetically related layers in physical, chemical, and biological properties or characteristics including but not limited to color, structure, texture, consistence and ph.

18. Soil Texture - the relative proportions of the various soil separates in a soil.

19. Soil Textural Classes - USDA standardized terms used to convey textural make-up of the fine-earth fraction less than two millimeters in diameter. The fine-earth fraction includes sand (2.0 - 0.05mm in size), silt (0.05mm - 0.002mm in size) and

clay (less than 0.002mm in size) particles. The specific textural classes are defined as follows:

20. Soil Type - a subdivision of the soil series based on texture of the surface horizon.

21. Treatment - a process applied to wastewater which causes the resulting effluent to meet or exceed EPA secondary standards for treated wastewater for surface discharge and which does not endanger the public health.

22. Water Table - that level in saturated soil where the hydraulic pressure is zero.

23. Water Table, perched or seasonal - the water table of a discontinuous saturated zone in a soil, indicated by "gleyed" colors of Chroma 2 or less (Munsell color chart) in mottles or a solid mass.

III. Site Evaluation

1. Information obtained during the soil and site evaluation will determine which type(s) of IOWDS may be utilized for an individual lot.

2. Prior to completing the Soil and Site Evaluation/System Recommendation, the Environmentalist shall visit the lot and conduct the soil and site evaluation.

3. The soil determinations will be made based on soil borings to a depth of five feet or to a depth sufficient to reach a restrictive horizon. Restrictive soil or site conditions may preclude the use of any subsurface disposal system.

4. A soil and site evaluation will be based on the following criteria:

    a. Absence of or protection from frequent flooding.

    b. Landscape position with good surface runoff.

    c. Slopes of less than 15%.

    d. Depth to high water table of greater than four feet.

    e. Depth to bedrock, fragipan or plinthite of greater than four feet.

    f. Soil texture and color defined by the Natural Resource Conservation Service as indicating good drainage and suitability for soil absorption, based on a soil boring of five feet.

g. Available area in which to install an individual onsite wastewater disposal system meeting all requirements of this regulation. The area for repairs and future extensions shall be no less than 50% of the space required for the recommended system. Systems utilizing surface land application discharge are exempt from the 50% additional area requirement.

5. The non compliance of one or more of the above items may require a design alteration of an underground system.

IV. Location of Onsite Wastewater Disposal Systems

1. All components of the onsite wastewater disposal system shall be located a minimum of:

   a. five feet from any dwelling.

   b. ten feet from any property line.

2. Any vessel holding wastewater shall be located a minimum of 50 feet from any public, private or individual potable water source.

3. The effluent disposal field shall be located at a lower elevation or in a landscape position that will preclude any surface runoff from flowing in the direction of the well site and a minimum of 100 feet from any public, private or individual potable water source.

4. Potable water lines shall not pass under or through any part of the sewage disposal system. Where a water supply line must cross a sewer line, the bottom of the water service within ten feet of the point of crossing, shall be at least 12 inches above the top of the sewer line. The sewer line shall be of Schedule 40 pipe with cemented joints at least ten feet on either side of the crossing. Water and sewer lines shall not be laid in the same trench. The water and sewer lines, when laid on the same elevation , shall maintain a minimum separation distance of 10 feet.

5. The surface of or the surface above the disposal field shall not be used for vehicular traffic or vehicular parking.

6. No portion of an onsite wastewater disposal system shall be located under dwellings or other permanent structures.

7. Effluent disposal systems shall not be located in depressed areas where surface water will accumulate. Provision shall be made to minimize the flow of surface water over the effluent disposal field.

8. Subsurface wastewater disposal fields located on slopes of less than eight percent shall have a minimum setback from recreational waters, shellfish waters or other sensitive areas **[See Table I]**.

9. Subsurface wastewater disposal fields located on slopes of greater than eight percent shall be located a minimum of 100 feet from recreational waters, shellfish waters and other sensitive areas.

10. Slopes of greater than 30% shall not be considered for subsurface disposal installation.

11. Where all or part of the onsite wastewater disposal system is proposed to be installed on property other than the owner's, an easement in perpetuity shall be legally recorded in the proper county. The easement shall be of sufficient area to permit access, construction and maintenance of the onsite sewage disposal system.

12. No site for an effluent disposal field or expansion area shall be approved which is located wholly within an area which is frequently flooded, swamp, marsh, or wetland. Except that if permits have been issued by the proper regulatory agency authorizing the use of wetlands for building sites, the property shall be evaluated using standard soil and site criteria for IOWDS.

13. When a proposed lot is located partially within a frequently flooded area, that portion of said lot not within the flood prone area may be considered for approval for the effluent disposal field.

14. There shall be maintained a minimum of 12 inches of unsaturated soil between the bottom of the subsurface disposal system and a perched or seasonal water table in soils that contain a restrictive horizon (fragipan, chalk, bedrock, clay or silty clay) within five feet of the surface.

15. There shall be maintained a minimum of 24 inches of unsaturated soil between the bottom of the subsurface disposal system and any perched or seasonal water table in soils that do not contain a restrictive horizon (fragipan, chalk, bedrock, clay or silty clay) within five feet of the surface.

16. Easements or right-of-way areas for utilities, surface or subsurface drainage, roads, streets, ponds or lakes shall not be used as available space for location of individual onsite sewage disposal systems.

TABLE I SETBACK REQUIREMENTS FOR SENSITIVE WATERS

Setback Requirements from Sensitive Waters For all Subsurface Absorption Field Areas on Slopes of 8 Percent or Less:

*Soil Textural Class	Minimum Distance From Water Edge
Gravel (Skeletal)	Not Applicable
Coarse to medium sand, fine sand, loamy sand, sandy loam, silty clay, clay	100 Ft.
Loam, silt, silt loam, sandy clay loam, Silty clay loam, clay loam,	50 Ft.

*The texture of the subsoil material having the greatest permeability rates within the absorption area, inclusive of material to a depth of two feet below the absorption trenches or beds.

V. Underground Absorption

1. Aggregate replacement systems shall comply with all criteria for subsurface gravel disposal systems except in sections pertaining to the gravel media or as specified in this regulation.

2. The size of the subsurface sewage disposal system shall be determined by soil texture and estimated wastewater flow.

3. Soils with excessively rapid permeability rates, gravel and coarse sand, shall be considered unsuitable for subsurface disposal unless the native soil is replaced with a suitably thick (greater than two feet) layer of loamy sand or sand textured soil.

4. Soils with excessively slow permeability rates, silty clay and clay, shall be considered unsuitable for conventional subsurface disposal.

5. Subsurface disposal systems shall be placed no deeper than 36 inches below the surface.

6. Aggregate replacement subsurface disposal systems shall have a minimum 12 inches of soil backfill.

7. The minimum distance between absorption trench sidewalls shall be six feet.

9. Trenches shall not be excavated when the soil is wet enough to smear or compact easily.

11. There shall be a minimum of three feet of undisturbed soil between the excavation for the septic tank or treatment plant and the beginning of the absorption trench, bed or effluent line.

12. The bottom of the outlet of the septic tank, aerobic treatment plant or vessel supplying effluent to the pipe must be a minimum of one inch above the top of the gravel replacement system.

17. Care must be taken when backfilling to prevent the pipe from shifting during the backfilling process.

18. Soil material excavated from trenches shall be used in backfilling and should be left mounded over the trenches until initial settling has taken place.

20. Standard manufactured fittings compatible with the pipe shall be used to connect all pipes within the effluent disposal field.

VI. Alternating Disposal Fields

1. An alternating effluent disposal field system provides two complete disposal fields, separated by a valving system so that each system could alternately be used and rested. This "resting" has shown to be useful in regenerating the soil's capability for absorbing the effluent.

2. The size of each field can be from 50 to 100 percent of the required square footage of a single disposal field.

3. The length of time each field would be used and then rested will be determined on a case-by-case basis.

VII. Shallow and Ultra-shallow Disposal Fields

Shallow or ultra-shallow systems can sometimes be used where the depth to the restrictive horizon or water table is less than the minimum required. Placement of the system may be as shallow as 6 inches for large diameter double-six aggregate replacement pipe systems. Ultra-shallow installations shall be restricted to soil textures of loam or lighter. Shallow installations may be placed in any texture shown as suitable in the system specific sizing tables.

Large Diameter Aggregate Replacement Systems III-A

VIII. Sizing

The large diameter aggregate replacement systems shall be sized in accordance with the following tables.

TABLE II **RESULTS OF SOIL EVALUATION**
TEN INCH

Soil Textural Class	Ribbon Length (inches)	Absorption Area lineal ft./bedroom	Additional absorption lineal ft./person over 2 persons/bedroom
Gravel and Coarse Sand	Not Suitable		
Coarse to Medium Sand	-	42	21
Fine Sand, Loamy Sand	-	63	32
Sandy Loam	<.5	83	42
Loam	<.5	83	42
	.5-1	112	56
Silt Loam	<1	112	56
Sandy Clay Loam	1-2	112	56
*Silty Clay Loam or, *Clay Loam	1-1.5	167	83
	1.5-2.0	250	125
Sandy Clay, Silty Clay, Clay	>2.0	Not Suitable	

*Construction should proceed when the soil is sufficiently dry to resist compaction and smearing during excavation. This point is reached when soil material crumbles when trying to roll a sample into a wire between the palms of the hands.

TABLE III **RESULTS OF SOIL EVALUATION**
DOUBLE SIX and EIGHT INCH

Soil Textural Class	Ribbon Length (inches)	Absorption Area lineal ft./bedroom	Additional absorption lineal ft./person over 2 persons/bedroom
Gravel and Coarse Sand	Not Suitable		
Coarse to Medium Sand	-	63	32
Fine Sand, Loamy Sand	-	95	48
Sandy Loam	<.5	125	63
Loam	<.5	125	63
	.5-1	168	84
Silt Loam	<1	168	84
Sandy Clay Loam	1-2	168	84
*Silty Clay Loam or, *Clay Loam	1-1.5	250	125
	1.5-2.0	375	188
Sandy Clay, Silty Clay, Clay	>2.0	Not Suitable	

*Construction should proceed when the soil is sufficiently dry to resist compaction and smearing during excavation. This point is reached when soil material crumbles when trying to roll a sample into a wire between the palms of the hands.

IX. Construction

1. Large diameter aggregate replacement absorption trenches shall be a minimum of 24 inches and a maximum of 36 inches in width.

2. The bottom of the trenches or bed and the distribution lines shall have a grade from level to no greater than two inches fall per 100 feet for double six inch large diameter aggregate replacement pipe and one inch fall per 100 feet for eight and ten inch large diameter aggregate replacement pipe.

3. Overlap filter wrap at coupling joints and seal using factory approved methods .

4. The 4" pipe from the septic tank, aerobic treatment plant or vessel supplying effluent to the aggregate replacement pipe shall be installed into an offset connector particular to the type and manufacturer of the pipe. These connectors will also be used when crossovers are constructed to change elevations of field system.

5. Fabric must be pulled over offset connector and sealed using a factory approved method.

6. The ends of the large diameter aggregate replacement pipe shall be closed with an end cap particular to the type and manufacturer of the pipe.

7. Care must be taken during backfilling to prevent the aggregate replacement pipe from "crawling" when backfill is applied.

X. Distribution of Effluent

1. Aggregate Replacement Pipe Systems

a. When a change in elevation of the disposal trench is required, a distribution box, connecting lateral or crossover must be used. At the point where a crossover line leaves a lateral, the trench for the crossover line shall be dug no deeper than the top of the Aggregate replacement pipe in the preceding trench so that an undisturbed block of earth will remain in place for the full depth of the aggregate replacement pipe. The distribution box shall be level and supply all lines equally. Field lines must be equal lengths when served by one distribution box.

b. Distribution boxes may be used to connect the effluent line to the effluent distribution lines. Non-perforated rigid pipe shall exit the distribution box for a minimum of five feet at level grade before the effluent distribution line (perforations) begins.

c. Crossover lines shall be laid on undisturbed earth. The invert of the crossover must be at least four inches lower than the invert of the septic tank outlet line. Crossovers shall be constructed as shown in **Figure 1**.

XI. Absorption Beds

Absorption beds may be constructed using large diameter aggregate replacement filter wrap pipe.

1. Absorption beds and trenches should be located a minimum of 10 feet from any trees.

2. The amount of linear footage required shall be the same as for trench configurations. The bottom of the bed should have a relatively level grade; the grade within the bed shall not exceed the grade allowed for trench installations.

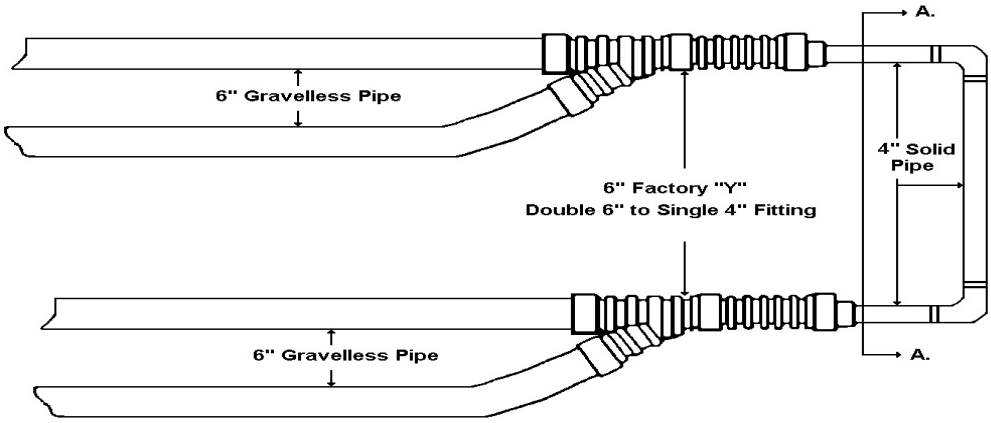
3. Lines for distributing effluent shall be spaced from 3 to 6 feet apart with the first and last pipe placed next to the sidewall of the bed. The number of lines will depend on the lineal feet of aggregate replacement line (Table II & III) and width of the bed to be constructed.

4. Care should be taken to prevent heavy machinery from damaging the bed during backfilling.

5. The effluent must be equally distributed to the bed by means of a distribution box or with a pipe manifold.

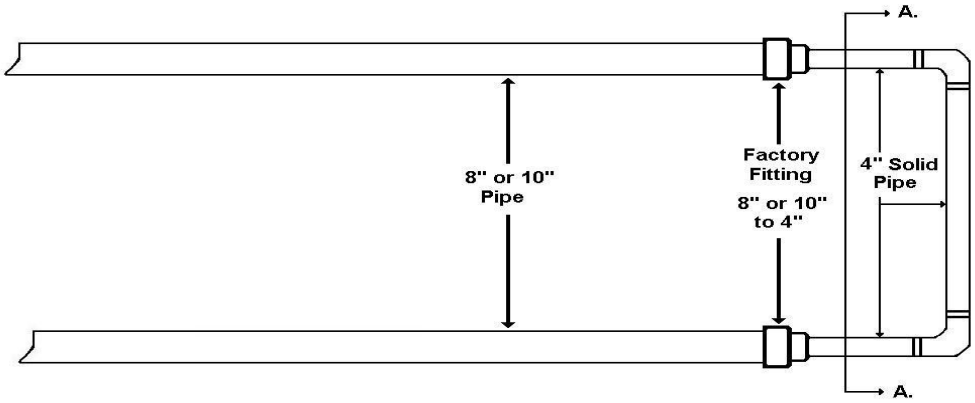
6. When a change in elevation of the disposal trench is required, a connecting lateral or crossover must be used. At the point where a crossover line leaves a lateral, the trench for the crossover line shall be dug no deeper than the top of the aggregate replacement pipe in the preceding trench so that an undisturbed block of earth will remain in place for the full depth of the pipe. Crossover lines shall be laid on undisturbed earth. The invert of the crossover must be at least four inches lower than the invert effluent line of the septic tank, aerobic treatment plant or vessel supplying effluent to the pipe **[Figure 1]**.

FIGURE 1
CONNECTING LATERAL



Top View (Double Six Connecting Lateral)

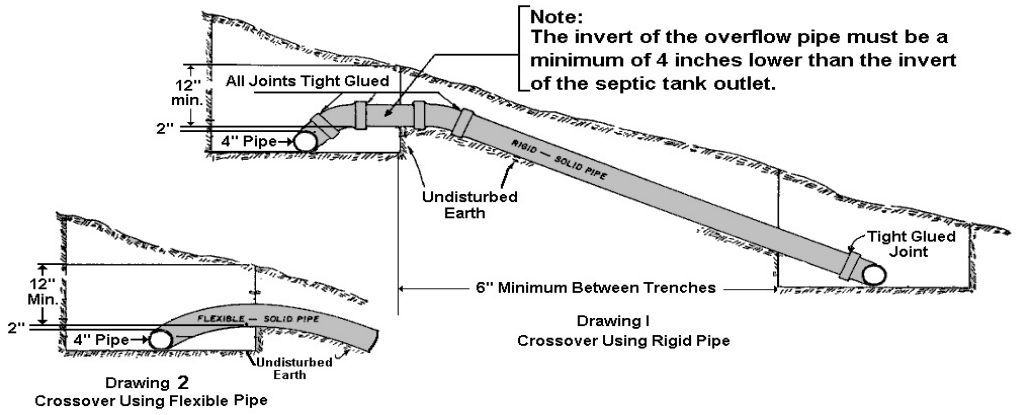
The double six lines shall be joined with a factory connector that will reduce the two lines to a single four inch pipe. The crossover will be constructed with solid pipe and the factory connector will be used to go from four inch to double six for the lower line.



Top View (8 and 10 inch Connecting Lateral)

The upper line shall be joined to the crossover line with a factory connector that will reduce the 8 or 10 inch line to a four inch pipe. The crossover will be constructed with solid pipe and the factory connector will be used to go from four inch to 8 or 10 inch pipe for the lower line.

Sectional View "A"
Connecting Lateral



Use factory reducing fittings appropriate to the large diameter aggregate replacement pipe to reduce to four inches and construct the connecting lateral as shown above.

Multi-Pipe Gravel Replacement Systems III-B

XII. General

The multi-pipe gravel replacement system is a system that utilizing bundles of four inch perforated pipe to provide a void space. The top pipe in one bundle of this system receives the treated effluent for distribution throughout the disposal system.

XIII. Sizing

The multi-pipe gravel replacement systems shall be sized in accordance with the **TABLE IV**.

XIV. Construction

1. The bottom of the trenches and the distribution lines shall have a grade from level to no greater than two inches fall per 100 feet for multi-pipe gravel replacement systems.

2. Multi-pipe gravel replacement system trenches shall be a minimum of 24 and a maximum of 36 inches in width.

3. The multi-pipe gravel replacement system must be installed with effluent being distributed to each trench distribution pipe by use of a distribution box or a level pipe header.

    a. When a change in elevation of the disposal trench is required, a distribution box or approved crossover shall be used. The distribution box, if used, shall be level and supply all lines equally.

    b. Distribution boxes may be used to connect the effluent line to the effluent distribution lines. Non-perforated rigid pipe shall exit the distribution box for a minimum of five feet at level grade before the effluent distribution line (perforations) begins.

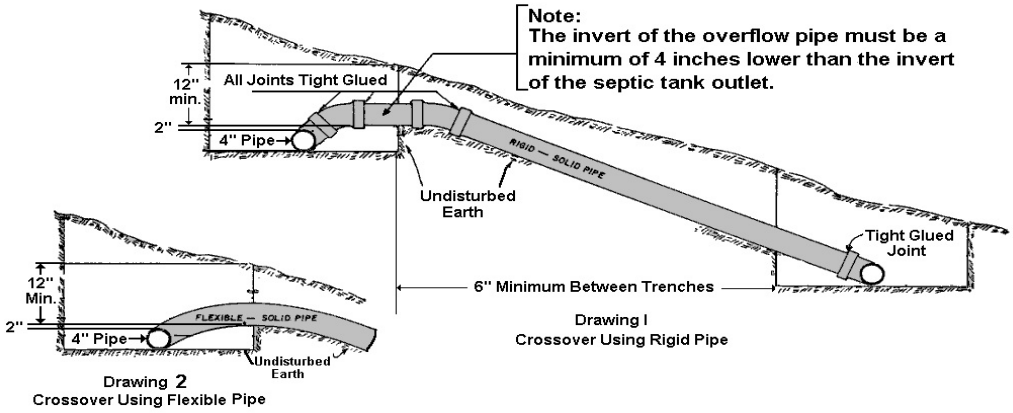
4. The system shall be covered with a manufacturer-approved, geotextile cloth before backfilling.

5. The geotextile cloth shall cover the open ends of the void and distribution pipes at their termination at the ends of the trench.

6. Multi-pipe gravel replacement systems shall not be used in “bed” configurations.

7. When a change in elevation of the disposal trench is required, an additional distribution box or connecting lateral/crossover must be used. At the point where a crossover line leaves a lateral, the trench for the crossover line shall be dug no deeper than the top of the multi-pipe aggregate replacement distribution pipe in the preceding trench so that an undisturbed block of earth will remain in place for the full depth of the distribution system. Crossover lines shall be laid on undisturbed earth. The invert of the crossover must be at least four inches lower than the invert effluent line of the septic tank, aerobic treatment plant or vessel supplying effluent to the pipe.

Sectional View "A"
Connecting Lateral



Use factory fittings appropriate to the Multi-pipe aggregate replacement system to construct the connecting lateral as shown above.

TABLE IV RESULTS OF SOIL EVALUATION

The following rates should be used to size Multi-Pipe Systems.#

Soil Textural Class	Ribbon Length (inches)	Absorption Area in Lineal Feet/Bedroom by Type of Multi-Pipe Configuration				Additional Absorption Area in Lineal Feet/ Person Over 2 Persons/Bedroom by Type of Multi-Pipe Configuration			
		14 Pipe Configuration	13 Pipe Configuration	11 Pipe Configuration	9 Pipe Configuration	14 Pipe Configuration	13 Pipe Configuration	11 Pipe Configuration	9 Pipe Configuration
Gravel and Coarse Sand	Not Suitable								
Coarse to Medium Sand	-	42	32	37	44	20	15	18	21
Fine Sand, Loamy Sand	-	63	48	56	67	32	24	28	34
Sandy Loam	<.5	83	63	74	88	42	32	37	44
Loam	<.5	83	63	74	88	42	32	37	44
	.5-1	112	85	99	118	55	42	49	58
Silt Loam	<1	112	85	99	118	55	42	49	58
Sandy Clay Loam	1-2	112	85	99	118	55	42	49	58
*Silty Clay Loam or, *Clay Loam	1-1.5	167	127	148	177	83	63	74	88
	1.5-2.0	250	190	223	265	125	95	111	133
Sandy Clay, Silty Clay, Clay	>2.0	Not Suitable							

*Construction should proceed when the soil is sufficiently dry to resist compaction and smearing during excavation. This point is reached when soil material crumbles when trying to roll a sample into a wire between the palms of the hands

#All bundle sections shall be full length as supplied by manufacturer. The use of on-site cut bundle sections is prohibited. The above chart is a minimum sizing not taking into consideration manufacturer's supplied lengths; therefore the needed lengths should be rounded up to at least the nearest manufacturer's provided lengths.

Expanded Polystyrene (EPS) Aggregate Systems III-C

XV. General

The EPS Aggregate system utilizes bundles of expanded polystyrene aggregate to replace rock aggregate in a subsurface disposal system. Effluent is distributed via a 4 inch perforated pipe incorporated into the center of one EPS bundle. System configurations of multiple bundles will incorporate one bundle run containing the 4 inch perforated pipe in conjunction with bundles containing only EPS aggregate. This 4 inch perforated pipe receives the treated effluent for distribution throughout the trench. The expanded polystyrene aggregate must be contained in a material that is resistant to the effects of wastewater, will prevent the loss of aggregate from the container and strong enough to retain the shape of the bundles during system installation and backfilling. All EPS Aggregate Systems must be installed by a factory-trained installer that is an authorized representative of the manufacturer.

XVI. Construction

1. The EPS Aggregate System absorption trenches shall be a minimum of 24 inches and a maximum of 36 inches in width.

2. The bottom of the trenches and the distribution lines shall have a grade from level to no greater than two inches fall per 100 feet.

3. The grade shall be measured from the trench bottom and not the effluent distribution line encased in the EPS bundle.

4. The EPS Aggregate system shall be covered with an approved cover material before backfilling. Covering material shall consist of craft paper or other bio-degradable product approved and/or supplied by the manufacturer.

XVII. Distribution of Effluent [EPS Aggregate System]

1. When a change in elevation of the disposal trench is required, a distribution box, connecting lateral or crossover must be used. At the point where a crossover line leaves a lateral, the trench for the crossover line shall be dug no deeper than the top of the distribution pipe in the preceding trench so that an undisturbed block of earth will remain in place for the full depth of the system **[Figure 2]**. The invert of the crossover must be at least four inches lower than the invert of the septic tank outlet line.

2. Distribution boxes may be used to connect the effluent line to the effluent distribution lines. The distribution box shall be level and supply all lines equally. Field lines must be equal lengths when served by one distribution box. Non-perforated rigid pipe shall exit the distribution box for a minimum of five feet at level grade before the effluent distribution line (perforations) begins.

XVIII. Absorption Beds [EPS Aggregate Systems]

Absorption beds may be constructed using the EPS Aggregate system.

1. Absorption beds and trenches should be located a minimum of 10 feet from any trees.

3. The amount of linear footage required for EPS horizontal systems shall be the same as for trench configurations **[Table V]**. The bottom of the bed should have a relatively level grade; the grade within the bed shall not exceed the grade allowed for EPS trench installations. EPS triangular systems shall not be used in bed configurations.

4. The EPS bundles shall be placed side by side in the bed. The number of bundles will depend on the lineal footage required and the width of the bed to be constructed.

5. Care should be taken to prevent heavy machinery from damaging the bed during backfilling.

6. The effluent must be equally distributed to the bed by means of a distribution box or with a pipe manifold.

XIX. Sizing

EPS Aggregate systems shall be sized in accordance with the following:

TABLE V [EPS] HORIZONTAL CONFIGURATIONS

Soil Textural Class	Ribbon Length (inches)	Absorption Area in Lineal Feet/Bedroom by Type of EPS Horizontal Configuration				Additional Absorption Area in Lineal Feet/Person Over 2 Persons/Bedroom by Type of EPS Configuration			
		3 Ten Inch Bundle Configuration	1 Twelve Inch Bundle Configuration	2 Twelve Inch Bundle Configuration	3 Twelve Inch Bundle Configuration	3 Ten Inch Bundle Configuration	1 Twelve Inch Bundle Configuration	2 Twelve Inch Bundle Configuration	3 Twelve Inch Bundle Configuration
Gravel and Corse Sand	Not Suitable								
Corse to Medium Sand	–	35	86	43	29	17	41	21	14
Fine Sand, Loamy Sand	–	53	131	66	44	26	66	33	22
Sandy Loam	<.5	69	173	87	58	35	86	43	29
Loam	<.5	69	173	87	58	35	86	43	29
	.5 – 1	93	231	116	77	46	114	57	38
Silt Loam	<1	93	231	116	77	46	114	57	38
Sandy Clay Loam	1 – 2	93	231	116	77	46	114	57	38
*Silty Clay Loam or, *Clay Loam	1 – 1.5	138	345	173	115	69	173	87	58
	1.50– 2.0	208	518	260	173	104	259	130	86
Sandy Clay, Silty Clay, Clay	>2.0	Not Suitable							

***Construction should proceed when the soil is sufficiently dry to resist compaction and smearing during excavation. This point is reached when soil material crumbles when trying to roll a sample into a wire between the palms of the hands.**

TABLE VI [EPS] TRIANGULAR CONFIGURATION [3 TEN INCH BUNDLES]

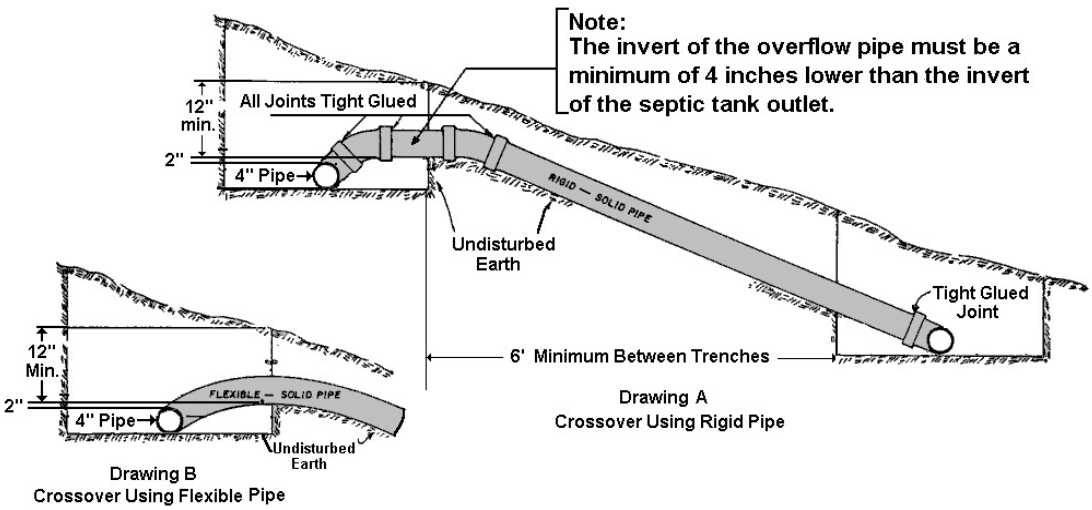
Soil Textural Class	Ribbon Length (inches)	Absorption Area lineal ft./bedroom	Additional absorption lineal ft./person over 2 persons/bedroom
Gravel and Coarse Sand	Not Suitable		
Coarse to Medium Sand	-	31	15
Fine Sand, Loamy Sand	-	48	24
Sandy Loam	<.5	63	32
Loam	<.5	63	32
	.5 – 1	84	42
Silt Loam	<1	84	42
Sandy Clay Loam	1 – 2	84	42
*Silty Clay Loam or, *Clay Loam	1 – 1.5	125	63
	1.5 – 2.0	188	94
Sandy Clay, Silty Clay, Clay	>2.0	Not Suitable	

***Construction should proceed when the soil is sufficiently dry to resist compaction and smearing during excavation. This point is reached when soil material crumbles when trying to roll a sample into a wire between the palms of the hands.**

Figure 2
Connecting Lateral
[Spill Overs]

Connecting laterals must be used when changes in elevation of subsurface disposal fields is necessary. Connecting laterals must be constructed according to Drawing I.

DRAWING I



Chamber Subsurface Disposal Systems III-D

XX. General

Chamber systems utilize molded plastic bottomless chambers which are installed in a drainfield excavation with the open bottom of the chamber in direct contact with the trench bottom. The chambers are linked together in such a manner as to completely cover the excavation with adjacent chambers in contact with each other. Effluent is introduced into the chambers and is absorbed into the soil for final treatment and disposal. All chamber systems must be installed by a factory trained and authorized installer.

XXI. Chamber Class Designation

1. **Each model of chamber will be assigned a class designation based on the bottom square footage of the chamber section. This square footage will be derived by a multiple of the outside width and the useable length of the chamber section.**

2. **Chamber models will be assigned a class designation according to Table VII.**

Table VII

Class	Square Feet/Chamber Section
I	7.51-9.50
II	9.51-11.50
III	11.51-13.50
IV	13.51-15.50
V	15.51-17.50
VI	17.51-19.50
VII	19.51-21.50
VIII	21.50-23.50

XXII. Construction

1. **The chamber system absorption trenches shall be a minimum of 18 inches and a maximum of 36 inches in width.**

2. **The bottom of the trenches shall have a grade from level to no greater than two (2) inches fall per 100 feet.**

3. **The grade shall be measured from the trench bottom and not the chamber top.**

4. **The chamber system shall be covered as per the manufacturers specifications. In all cases there shall be a minimum of 12 inches of soil cover over the chamber system.**

5. **The minimum height of a chamber, at its centerline, shall be eleven (11) inches.**

6. **The last chamber in each "run" shall be terminated with an end plate.**

XXIII. Distribution of Effluent [Chamber Systems]

1. **When a change in elevation of the chamber system is required, a distribution box, connecting lateral or crossover must be used. At the point where a crossover line leaves a lateral, the trench for the crossover line shall be dug no deeper than the top of the endplate inlet or the inlet in the top of the chamber in the preceding trench so that an undisturbed block of earth will remain in place for the full depth of the system. The invert of the crossover must be at least four inches lower than the invert of the septic tank outlet line.**

2. **Distribution boxes may be used to connect the effluent line to the effluent distribution lines. The distribution box shall be level and supply all lines equally. Field lines (chambers) must be equal lengths when served by one distribution box. Non-perforated rigid pipe shall exit the distribution box for a minimum of five feet at level grade before the effluent distribution line begins.**

XXIV. Sizing of the Chamber System

1. **Chamber systems installed in a trench configuration shall be sized in accordance with Table VIII.**

2. **Chamber systems installed in a bed configuration shall have the same number of chamber sections as indicated for a trench system. The length and width of the bed to be constructed will depend on the number of chamber sections to be installed as indicated by Table VIII. Any side-by-side placement of chambers shall constitute a bed.**

    a. **Absorption beds and trenches should be located a minimum of 10 feet from any trees.**

b. The bottom of the bed should have a relatively level grade; the grade within the bed shall not exceed the grade allowed for trench installations.

c. The chambers shall be placed side by side in a bed with separation between each chamber row per individual manufacturers requirements.

d. Care should be taken to prevent heavy machinery from damaging the bed during backfilling.

e. The effluent must be equally distributed to the bed by means of a distribution box or with a pipe manifold.

TABLE VIII

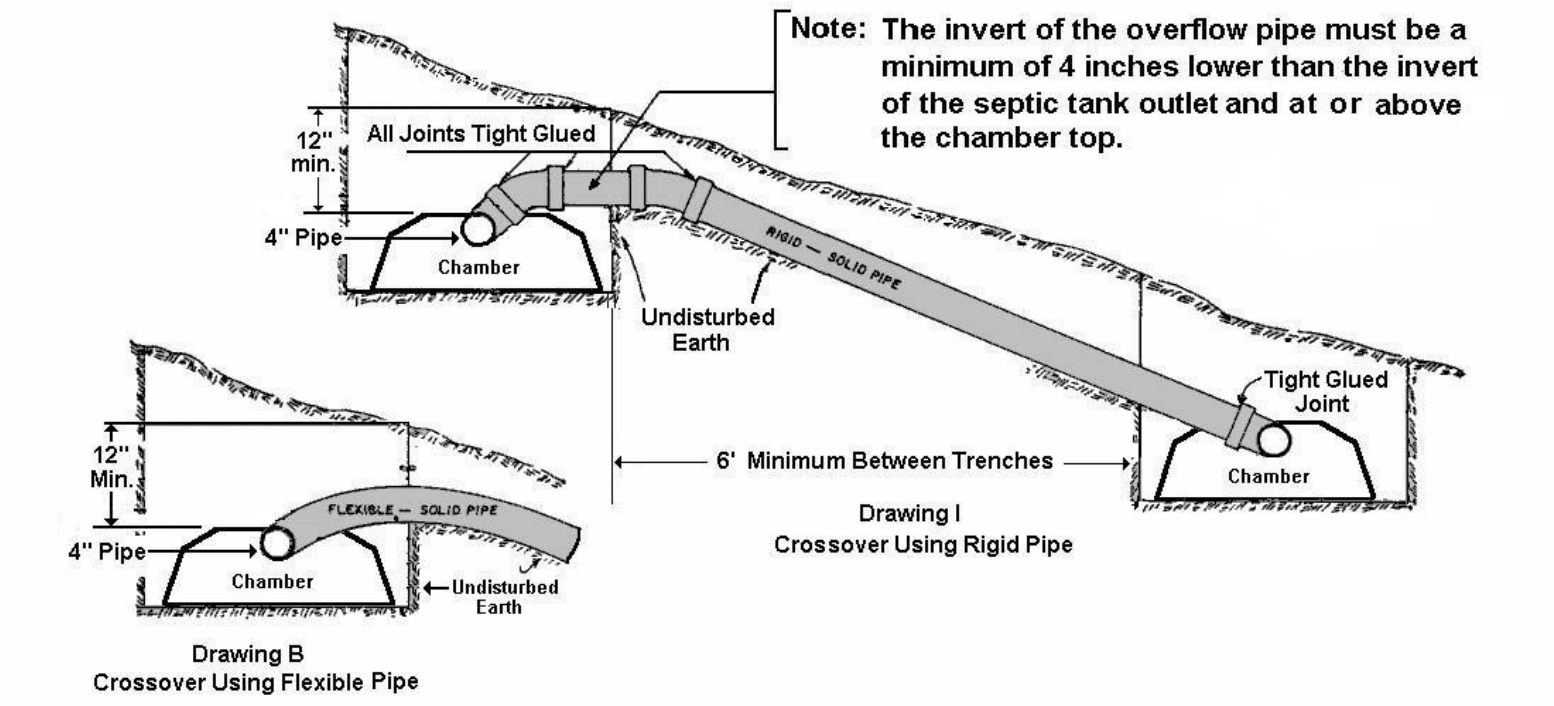
The following rates should be used to size Chamber Systems.

Soil Textural Class	Ribbon Length (inches)	Absorption Area in sq.ft./ bedroom	Absorption Area* in Chambers /bedroom by Class of Chamber System								Additional Absorption Area in Chambers/ Person Over 2 Persons/Bedroom by Class of Chamber System							
			I	II	III	IV	V	VI	VII	VIII	I	II	III	IV	V	VI	VII	VIII
Gravel and Coarse Sand	Not Suitable																	
Coarse to Medium Sand	-	88	10	8	7	6	5	5	4	4	5	4	3	3	3	2	2	2
Fine Sand, Loamy Sand	-	133	15	13	11	9	8	7	6	6	7	6	5	5	4	4	3	3
Sandy Loam	<.5	175	20	17	14	12	11	10	9	8	10	8	7	6	5	5	4	4
Loam	<.5	175	20	17	14	12	11	10	9	8	10	8	7	6	5	5	4	4
	.5-1	235	26	22	19	16	14	13	11	10	13	11	9	8	7	6	6	5
Silt Loam	<1	235	26	22	19	16	14	13	11	10	13	11	9	8	7	6	6	5
Sandy Clay Loam	1-2	235	26	22	19	16	14	13	11	10	13	11	9	8	7	6	6	5
*Silty Clay Loam or, *Clay Loam	1-1.5	350	39	33	28	24	21	19	17	16	19	17	14	12	11	9	9	8
	1.5-2.0	525	58	50	40	35	32	28	26	23	29	25	20	17	16	14	13	12
Sandy Clay, Silty Clay, Clay	>2.0	Not Suitable																

***Construction should proceed when the soil is sufficiently dry to resist compaction and smearing during excavation. This point is reached when soil material crumbles when trying to roll a sample into a wire between the palms of the hands**

***All chamber sections shall be full length. The use of cut chamber sections is prohibited.**

Figure 1


Note: The invert of the overflow pipe must be a minimum of 4 inches lower than the invert of the septic tank outlet and at or above the chamber top.
12" min.
All Joints Tight Glued
4" Pipe
Chamber
RIGID — SOLID PIPE
Undisturbed Earth
Tight Glued Joint
6' Minimum Between Trenches
Chamber
Drawing I
Crossover Using Rigid Pipe
12" Min.
FLEXIBLE — SOLID PIPE
4" Pipe
Chamber
Undisturbed Earth
Drawing B
Crossover Using Flexible Pipe